1. EXECUTIVE SUMMARY

This project was undertaken with the objective of obtaining an understanding of the hydrodynamic coupling of Albemarle and Pamlico Sounds via Croatan Sound in order to determine whether this coupling can account for the scarcity of ocean spawning finfish in Albemarle Sound. An eighteen month field project was mounted to achieve this objective. A total of eleven data collection stations was maintained during the course of the experiment. At ten of these moored stations, water level data was obtained. At four of these ten moorings water temperature, conductivity, and velocity data were also collected. Meteorological data was obtained from four land based stations. Data was collected continuously during each of six deployments; each deployment lasted about two months and during each deployment data was collected at seven to nine of the stations. Each instrument-stored data internally on cassettes which were removed following each deployment. The cassettes were brought from the field to North Carolina State University where the tapes were first transcribed onto computer tapes, then converted to binary data and then, following an editing process to raw data. The raw data were then subjected to a three hour filtering to separate the signal from the noise and then forty hour low passed to separate the high and low frequency parts of the signal. Statistical analyses of the data were performed including auto and cross-covariances. It was found that in Croatan Sound the currents near the surface and bottom were virtually always in the same direction and that these currents are primarily wind-driven. Under southward winds the water flows southward from Albemarle Sound through Croatan Sound and into Pamlico Sound and under northward winds the water flows northward from the Pamlico to the Albemarle via Croatan. The observed coherence of water motion with the wind has implications for the recruitment of ocean spawned finfish larvae and juveniles into Albemarle Sound as follows. Under southward winds, sea level rises on the ocean side of Oregon Inlet